

Claims

1. A thermosetting coating composition comprising a binder wherein 100 parts by weight of this binder comprises:
 - 5 (A) 1 to 50 parts by weight of a carboxylic acid group containing amorphous polyester having an acid number of from 15 to 100 mg KOH/g.
 - (B) 1 to 50 parts by weight of a carboxylic acid group containing semi-crystalline polyester, said polyester comprising the reaction product of an anhydride of a polybasic organic carboxylic acid and a hydroxyl group containing semi-crystalline polyester.
 - 10 (C) 1 to 90 parts by weight of a glycidyl group containing polyphenoxy resin having an epoxy equivalent weight of 150 to 1500 g/equiv.
 - (D) 0 to 85 parts by weight of a glycidyl group containing (meth) acrylate copolymer having an epoxy equivalent weight of 1.0 to 5.0 milli- equivalents of epoxy/gram of polymer.
 - 15 (E) 0 to 20 parts by weight of a curing agent different from (C) and (D) and having functional groups reactable with the polyester (A) and (B) carboxylic acid groups.
2. The composition according to Claim 1 wherein the carboxylic acid group containing amorphous polyester (A) is composed of from 50 to 100% mole of terephthalic acid or isophthalic acid or their mixtures and from 0 to 50% mole of an aliphatic,
 - 20 cycloaliphatic or aromatic polyacid different from terephthalic acid or isophthalic acid, referring to the polyacid constituents, and from 40 to 100% mole of neopentyl glycol and from 0 to 60% mole of another aliphatic and/or cycloaliphatic polyol referring to the polyol constituents.
3. The composition according to Claim 1 or 2 wherein the carboxylic acid group containing semi-crystalline polyester (B) is obtained from the ring opening reaction of the anhydride group of trimellitic anhydride and/or pyromellitic anhydride with a hydroxyl group containing semi-crystalline polyester having a hydroxyl number of from 15 to 70 mg KOH/g, and comprising from 70 to 100% mole of terephthalic acid, 1, 4-cyclohexanedicarboxylic acid or a linear chain dicarboxylic acid containing 4 to 16 carbon
 - 25 atoms and from 0 to 30% mole of another aromatic, aliphatic or cycloaliphatic polyacid, referring to the polyacid constituents, and from 70 to 100% mole of a cycloaliphatic or linear chain aliphatic polyol containing 2 to 16 carbon atoms and from 0 to 30% mole of another aliphatic or cycloaliphatic polyol, referring to the polyol constituents.
 - 30

4. The composition according to any of Claims 1 to 3 wherein the glycidyl group containing polyphenoxy resin (C) is a Bisphenol A based epoxy resin or a phenol or cresol epoxy Novolac.
5. The composition according to any of Claims 1 to 4 wherein the glycidyl group containing (meth)acrylate copolymer (D) is prepared from 10 to 90% mole of a glycidyl group containing monomer and from 90 to 10% mole of one or more monomer copolymerizable with the glycidyl group containing monomers, said (meth)acrylate copolymer having a number averaged molecular weight of from 1000 to 15000.
6. The composition according to any of Claims 1 to 5 wherein the curing agent (E) is triglycidyl isocyanurate, diglycidyl terephthalate, triglycidyl trimellitate, or a mixture of them, or a β -hydroxyalkylamide group containing compound.
7. The composition according to any of Claims 1 to 6 wherein the carboxylic acid group containing amorphous polyester (A) has the following properties:
a number averaged molecular weight of from 1100 to 15000,
a glass transition temperature (T_g) from 40 to 80°C and
an ICI (cone/plate) viscosity at 200°C ranging from 5 to 15000 mPa.s.
8. The composition according to Claim 7 wherein the carboxylic acid group containing amorphous polyester (A) has an acid number of from 30 to 70 mg KOH/g.
9. The composition according to any of claims 1 to 8 wherein the carboxylic acid group containing semi-crystalline polyester (B) has the following properties:
an acid number from 30 to 120 mg KOH/g,
a number average molecular weight ranging from 1100 to 17000,
a fusion zone from 50 to 150°C,
a glass transition temperature (T_g) below 40°C,
a degree of crystallinity of at least 5 J/g, and
an ICI (cone/plate) viscosity at 100°C of at least 10 mPa.s.
10. The composition according to Claim 9 wherein the acid number of (B) is from 50 to 100 mg KOH/g.
11. The composition according to any of Claims 1 to 10 wherein the glycidyl group containing acrylic copolymer (D) has the following properties:
a number average molecular weight ranging from 1000 to 15000,
a glass transition temperature (T_g) from 40 to 85°C, measured by Differential Scanning Calorimetry (DSC), according to ASTM D3418 with a heating gradient of 20°C per minute, and

an ICI (cone/plate) viscosity determined by the ICI method at 200°C of at least 100 mPa.s.

12. The composition according to any of Claims 1 to 11 containing from 0.1 to 5.0 parts by weight, referring to 100 parts of binder, of a catalyzing compound selected from the group consisting of amine, phosphine, ammonium salt and phosphonium salt catalysts.
13. The composition according to any of Claims 1 to 12 additionally containing:
UV-light absorbers and/or hindered amine light stabilizers,
flow control agents, and/or
degassing agents.
14. A clear lacquer containing the thermosetting powder composition of any of Claims 1 to 13.
15. The thermosetting powder coating composition according to any of Claims 1 to 13 additionally containing at least one of pigments, dyes and fillers.
16. A method for applying the thermosetting powder composition of any of Claims 1 to 13 and 15 which comprises applying it by an electrostatic or friction charging spray gun or fluidized bed technique.
17. An entirely or partially coated substrate, wherein the coating material used, is a powder coating composition containing the composition according to any of Claims 1 to 13 and 15.